APPENDIX 7
DOD GENERIC SWITCHING CENTER REQUIREMENTS (GSCR)
08 SEP 2003
Customer Premises Equipment (CPE) Requirements

A7.1 <u>Background</u>

This appendix describes the requirements that must be met by all Customer Premise Equipment (CPE) for them to be certified and used in the Defense Switched Network (DSN).

The requirements contained in this appendix are based on:

a. Policy for DOD voice networks as outlined in the Chairman of Joint Chiefs of Staff Instruction (CJCSI) 6215.01B, *"Policy for Department of Defense Voice Networks"*. CJCSI 6215.01B defines the DSN as being "an interbase, nonsecure or secure C2 telecommunications system that provides end-to-end command use and dedicated telephone service, voice-band data, and dial-up VTC for C2 and non-C2 DOD authorized users in accordance with national security directives." The CJCS instruction further specifies the need for the DSN to offer military unique features (MUFs) such as Multi-Level Precedence and Preemption (MLPP) and military Network Management (NM).

b. *"Department Of Defense Voice Networks Generic Switching Center Requirements (GSCR)"*, 08 Sep 2003.

c. Department Of Defense Instruction (DODI) 8100.3, 16 January 2004, *"Department of Defense (DoD) Voice Networks"*.

A7.2 <u>Purpose</u>

The purpose of this Appendix to the Defense Switch Network (DSN) Generic Switching Center Requirements (GSCR) document is to specify the CPE requirements so they can be certified for use in the Defense Switch Network (DSN).

A7.3 <u>Applicability</u>

This appendix applies to all DSN CPEs identified below, procured or leased for installation in the DSN. All services, features and functions (both unique military and standard commercial) identified in this GSCR and associated Appendixes are to be implemented in DSN assets including switches, trunks, lines, and ancillary equipment. This specification also applies to upgrades and new software loads for existing equipment.

The GSCR is the governing specification document that takes precedence over the explicit or implicit requirements of subsidiary or reference documents, standards, and specifications. In the event of conflict, the explicit requirements of the GSCR take precedence over the explicit or implicit requirements of the LATA Switching Systems Generic Requirements (LSSGR), Generic Requirements (GR), and DISAC 370-175-13.

A wide variety of CPE manufactured and sold by many sources can be connected to the line/subscriber and/or carrier/network side of a DSN switching center. Such variety include Industry "ANSI-ETSI STANDARDS" based digital and analog devices and non-STANDARDS based proprietary digital devices. The efficiency of such analog devices/equipment in converting an acoustic signal into an electric signal (and the reverse) is an important consideration in the development of the DSN transmission plan. The efficiency of the analog or digital CPE equipment affects the quality, loudness, noise, and echo performance of the overall connection.

This appendix covers those devices that are connected to a DSN switch via a 2 wire analog, 2 wire digital, or 4 wire digital interface (as illustrated in Figure A7.1) and that such devices are not required to have network management features/functionality. This covers devices such as answering machines, voice mail, automated call distributors, proprietary telephone sets, standards based telephone sets, facsimile machines, voice band modems, ISDN network termination 1 (NT1) devices and terminal adapters (TA), and certain devices that are deemed mandatory for local or host nation telecommunications network compliance (i.e., 911 Emergency Service).

The original interface requirement for a 911 Emergency Service system is typically an analog protocol that requires R2 signaling. Since the basic requirements of the GSCR did not mandate the R2 signaling it is therefore not a DSN requirement for such a system that uses the R2 protocol. The DSN however supports such a system via the ISDN BRI/PRI protocol and this Appendix applies to all 911 Emergency Service system(s) using the ISDN protocol.

The interfaces listed are further described below with the minimum features that are essential for maintaining the DSN quality of service. CPE's that are designed to actively control the interaction of switch supervision are further described to make a distinction between manual and automated CPE supervision control (i.e., FAX, Modems, versus Analog and Digital 2W Subscriber Instruments) to ensure MLPP transparent operation.
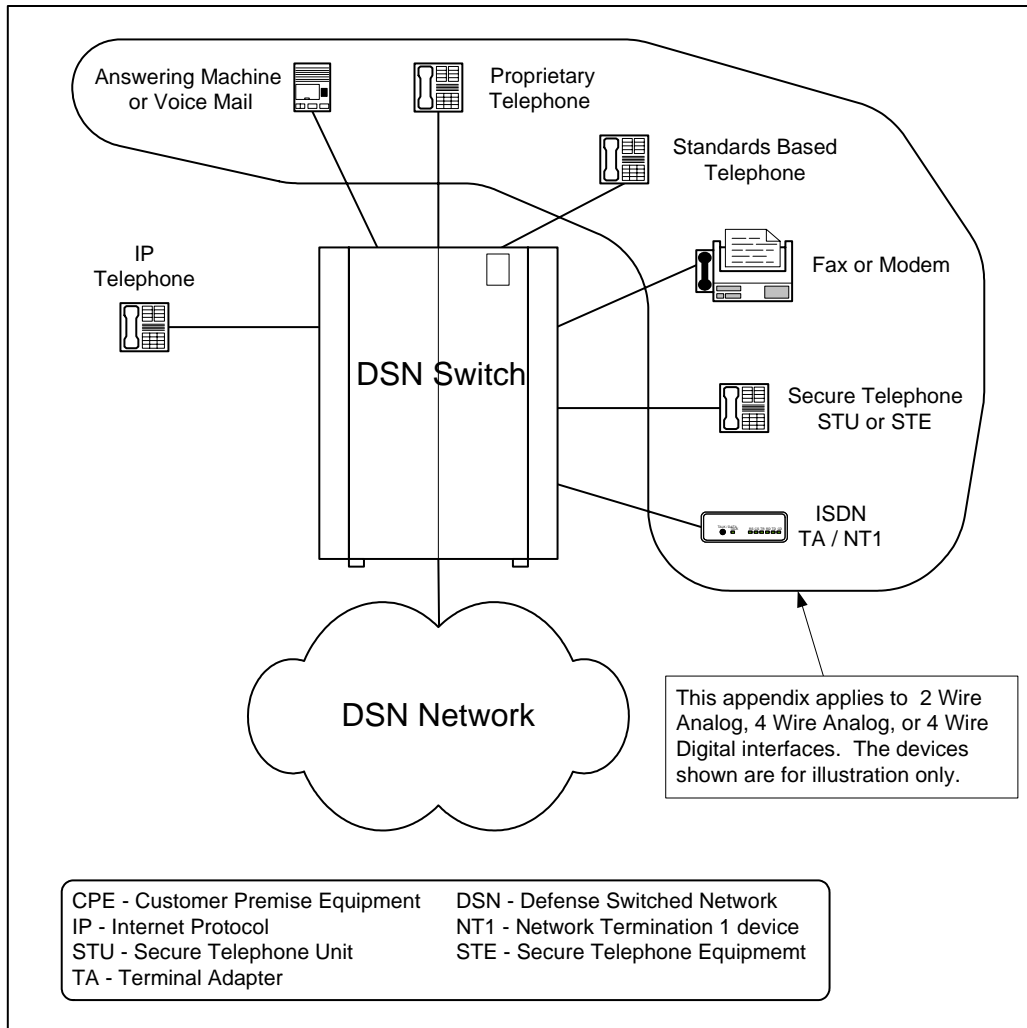
Figure A7.1 - Typical CPE connections to the DSN.

A7.4 <u>Definitions</u>

ISDN Devices: Integrated Services Digital Network (ISDN) specifies a number of reference points that define logical interfaces between functional ISDN devices such as terminals, terminal adapters, network termination devices, and line termination equipment. ISDN specifies a number of reference points that define the interconnect of these devices.

ISDN devices are defined as:

- TE1 – Terminals with built-in ISDN connection capability. (Also referred to as TE.)
- TE2 – An existing terminal device, designed for existing protocols. It is not capable of directly interoperating with ISDN.
- TA – An adaptive device designed to permit TE2s to inter-operate with ISDN.
- NT1 – A single (physical) layer device that contains all of the necessary interface elements to communicate with the network. It terminates the local loop and provides the user interface to the network while isolating this user from the operation of the network.

Figure A7.2 illustrates the ISDN specified reference points and the arrangement of terminal equipment. The reference points applicable for DSN CPE are:

U – The reference point for a Basic Rate Interface (BRI) connection between a local loop and a customer premise. The U interface specifies a single pair loop over which a logical four-wire circuit is derived.

S – The reference point between ISDN user terminal equipment (i.e., TE1 or TA) and the network termination equipment (NT1). This is a four-wire interface that supports the BRI 2B+D protocol.

R – The reference point representing a standardized non-ISDN interface such as EIA-232, EIA-422, V.24, V.35, etc. The combination of a TA and TE2 is equivalent to a TE1.
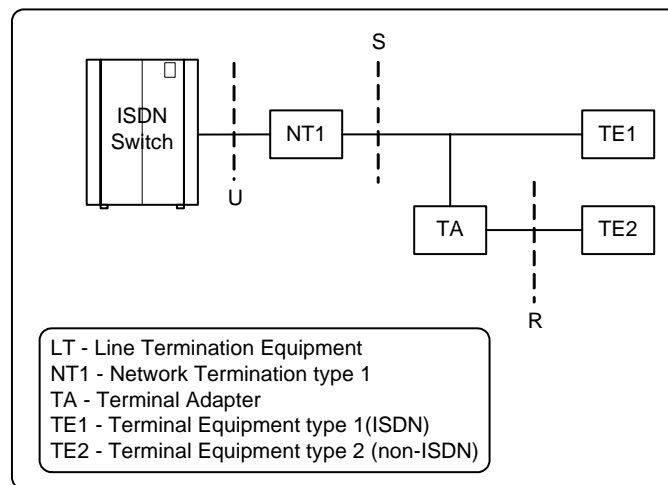

Figure A7.2 - ISDN Reference Points.

Required: These are features and capabilities considered necessary for devices covered by this appendix for DoD mission support based on DoD policies. These features and capabilities require certification prior to introduction into the DSN.

Conditional: These are features and capabilities that are not considered critical for DoD mission support based on DoD policies. It is recognized however, that such features do have utility for some users or for specific operations. If these features and capabilities are provided, the switch shall perform and meet the specifications as identified in this appendix.

A7.5 <u>Requirements</u>

All CPE devices covered by this appendix are required to meet the following requirements..

[Conditional] All CPE devices that support MLPP shall do so in accordance with the requirements as listed in Section 3 of the GSCR and shall not affect the DSN interface features and functions associated with line supervision and control.

[Required] All DSN CPE, as a minimum, must meet the requirements of Part 15 and Part 68 of the FCC Rules and Regulations, and the Administrative Council for Terminal Attachments (ACTA).

[Conditional] Device(s) that support auto-answer shall have a "Auto-Answer" mode settable have the feature to set the auto-answer mode to a "time" more than the equivalency of four (4) "ROUTINE" precedence ring intervals in accordance with GSCR Section 5.5.1. before "answer" supervision is provided.

[Conditional] Devices that are required to supported precedence calls above ROUTINE, shall respond properly to an incoming alerting (ringing) precedence call cadence as described in GSCR Section 5.5.1.

[Conditional] Device(s) that can "out-dial" DTMF and/or "DP" digits (automatic and/or manual) shall comply to the requirements as stated in GSCR Section 5.4.1 and 5.4.2, respectively, for its address digit generating capabilities and shall be capable of outpulsing DTMF digits specified in Telcordia Technologies GR-506-CORE, *"Signaling for Analog Interfaces"*, Issue 1 with Revision 1, June 1996."

[Conditional] Modems and facsimile machines shall be compatible with ITU and Bell standards, as applicable.

[Conditional] Facsimile devices, as a minimum, shall meet the requirements in accordance with the Department of Defense (DoD) Joint Technical Architecture (JTA).

[Conditional] If Configuration Management and/or Fault Management is provided by the CPE device so that it can be managed by the Advanced DSN Integrated Management Support System (ADIMSS) or other management systems, then the management information shall be provided by one or more of the below listed serial or Ethernet interfaces.

    a. Serial interfaces shall be in accordance with one of the following standards:

        1) ITU-T Recommendation V.35, *"Data transmission at 48 kilobits per second using 60-108 kHz group band circuits"*.

        2) TIA-232-F, *"Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange"*.

        3) EIA-449-1, *"General Purpose 37-Position and 9-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange"*.

        4) TIA-530-A, *"High Speed 25-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment, Including Alternative 26-Position Connector"*.

b. Ethernet interfaces shall be in accordance with IEEE Std 802.3-2002, *"Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications"*.

[Conditional] As a minimum, the 911 and the E911 (tandem) Emergency Service shall have the capability to "hold" the originating subscriber/caller from releasing the call via the switch supervision interaction for line and trunk control by the "called-party" feature, in accordance with Telcordia Technologies GR-529, *"LSSGR: Public Safety"*.

A7.5.1 2 Wire Analog Instruments / Devices

CPE(s) that connect to the DSN using a 2 wire analog interface (Analog Single Line Instrument/FAX/ Modem/Answering Machine/Voice Mail/Automated Call Distributor) shall meet the following requirements.

[Required] All 2 wire analog devices shall conform to the requirements of TIA/EIA-470-B, *"Telecommunications - Telephone Terminal Equipment - Performance and Compatibility Requirements for Telephone Sets with Loop Signaling (ANSI/TIA/EIA-470-B-97)"*.

A7.5.2 2 Wire Digital Instruments / Devices

CPE(s) that connect to the DSN using a 2 wire digital interface (Digital Single/Multi-Line Proprietary Instrument/FAX/Modem/ISDN BRI Devices including 911 Emergency Service).

[Conditional] CPE that use loop signaling shall conform to the requirements of TIA/EIA-470-B, *"Telecommunications - Telephone Terminal Equipment - Performance and Compatibility Requirements for Telephone Sets with Loop Signaling (ANSI/TIA/EIA-470-B-97)"*.

[Conditional] CPE(s) that connect at the ISDN BRI "U" interface shall conform to ANSI T1.601-1999, *"ISDN Basic Access Interface for Use on Metallic Loops for Application at the Network Side of NT, Layer 1 Specification"*.

A7.5.3 4 Wire Digital Instruments / Devices

[Conditional] CPE(s) that connect at the ISDN BRI "S" or "T" interface shall conform to ANSI T1.605-1991 (R1999), *"ISDN Basic Access Interface for S and T Reference Points and Layer 1 Specification"*.

A7.5.4 ISDN Terminal Adapter

The general function of a TA is to adapt terminals with non-ISDN standard interfaces (such as X- and V-series interfaces) to ISDN standard user-network interfaces. The TA shall adapt to, connect to, and/or be part of a data-type terminal. The TA connects terminal equipment (TE2), such as a computer, fax machine, LAN, telephone set, etc., to one or more B channels and passes along digital signals to the ISDN external line. A terminal adapter needs not be a separate unit but could be contained within the TE or integrated with the NT1 into a single box.

Terminal Adapter(s) shall meet the following requirements.

[Required] The TA shall be able to connect a non-ISDN terminal (TE2) to one or both of the B channels of an ISDN connection and establish a viable ISDN connection with a terminal at the distant end.

[Required] The TA shall meet its necessary requirements regardless if it is implemented as a stand-alone device or as a device integrated with either the TE2 it supports or the NT1 which connects it to the network.

[Required] The TA shall be compatible with National ISDN NI-1/2 as defined by GSCR, Section 2.3.3.

[Conditional][The TA shall provide loop back capability in accordance with ITU Recommendation V.54, *"Loop Test Devices For Modems"*.

[Conditional] The TA shall support inverse multiplexing in accordance with ITU Recommendation H.244, *"Synchronized Aggregation Of Multiple 64 Or 56 Kbit/S Channels"* and conform to Federal Telecommunications Recommendation 1080B-2002, August 15, 2002, *"Video Teleconferencing Services"*, when connected to TE2 equipment.

[Required] The TA shall provide one or more of the below interfaces:

a. EIA-366-A, *"Interface Between Data Terminal Equipment and Automatic Calling Equipment for Data Communication"*.

b. EIA-449-1, *"General Purpose 37-Position and 9-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange"*.

c. TIA -530-A, *"High Speed 25-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment, Including Alternative 26-Position Connector"*, Revised 1998.

d. ITU-T Recommendation V.35, *"Data transmission at 48 kilobits per second using 60-108 kHz group band circuits"*.

A7.5.5 <u>Automated Receiving Devices</u>

Automated Receiving Devices (ARD) are a family of automated devices, which are CPE or network elements, that attaches to the receiving end of a telephone call. Typical ARDs will have an automatic call distribution front-end which could be as simple as a queue that handles incoming calls on a first come first serve basis. More complex ARDs can be full function Automatic Call Distributors (ACD) that also include pre-determined scheme and routes calls based on routing criteria and, quite often, database handling instructions. Once in queue, if the

caller is not answered in a specified amount of time, and if the caller had not terminate the call, ARD can also terminate the call, or send the call to another location. Usually the ARD invokes a network carrier based "take back and transfer" to the alternative location. Generally, ARDs do not originate calls to the network.

ARDs can have different names. The following are some typical devices included in this family:

- Automatic Call Distributor
- Voice messaging system
- Automatic announcer
- Event Notification System
- Automated Attendant
- Morale Welfare and Recreation (MWR) Call Systems
- Call Center System

ARDs shall meet the following minimum requirements:

[Required] ARDs interfacing to the DSN shall meet at least one of the following interface types:

a. 2 wire interface as specified in Section A7.5.2 above.

b. 4 wire interface as specified in Section A7.5.3 above.

c. PCM-24 as specified in GSCR Section 7.1

d. PCM-30 as specified in GSCR section 7.2

[Required] All ARDs shall be implemented in the DSN to receive only 'ROUTINE' precedence calls. All precedence calls above ROUTINE destined for an ARD shall be diverted by the DSN switching system in accordance with GSCR Section 3.3, Precedence Call Diversion.

A7.6.5 Security

[Required] All CPE(s) shall meet security requirements as outlined in DODI 5200.40, 30 December 1997, *"Defense Information Technology Security Certification and Accreditation Process (DITSCAP)"* and the DSN Security Technical Implementation Guide, as applicable.